

CLAIMS

We claim:

1. A method of processing radiological images, comprising:  
  
registering first and second different radiological image sets, said first and second radiological image sets being obtained from a common portion of a common subject to generate a registered second radiological image set and a set of image parameters of said second radiological image set, the image parameters describing a shift of said second radiological image set relative to said first radiological image set; and  
  
performing a temporal comparison using said image parameters, said registered second radiological image set, and said first radiological image set.
2. The method according to Claim 1, wherein said registering comprises:  
  
performing body part registration.
3. The method according to Claim 2, wherein said registering further comprises:  
  
performing the following steps, prior to said body part registration, if the second set of radiological images only partially covers an area under consideration:  
  
performing slice matching of said second set of radiological images, relative to said first set of radiological images; and  
  
determining top and bottom positions of said second set of radiological images.

4. The method according to Claim 3, wherein said slice matching comprises:

determining a correlation length between said first and second sets of radiological images; and

shifting one of said sets of radiological images relative to the other.

5. The method according to Claim 4, wherein said common portion comprises a lung region, and wherein said determining a correlation length comprises:

performing lung segmentation on each of said first and second sets of radiological images to determine lung fields and contours of said first and second sets of radiological images;

for each of said first and second sets of radiological images, generating values of a lung-to-tissue ratio for a multiplicity of regions, based on said lung fields and contours, to produce first and second lung-to-tissue ratio curves corresponding to said first and second sets of radiological images;

cross-correlating at least a portion of each of said first and second lung-to-tissue ratio curves to obtain a correlation curve; and

determining said correlation length based on said correlation curve.

6. The method according to Claim 5, wherein said determining said correlation length comprises:

determining a maximum value of said correlation curve and determining said

correlation length to be a shift corresponding to said maximum value.

7. The method according to Claim 2, wherein said body part registration comprises:  
  
segmenting said first and second sets of radiological images to produce first and second sets of segmented radiological images;  
  
registering at least one segmented anatomic region of said second set of segmented radiological images with said first set of segmented radiological images to produce a registered second set of segmented radiological images; and  
  
combining said registered second set of segmented radiological images to produce said registered radiological image set and said image parameters.

8. The method according to Claim 7, wherein said segmenting further comprises:  
  
performing an anatomic region segmentation on said first and second sets of segmented radiological images to produce first and second sets of anatomic region image segments.

9. The method according to Claim 8, wherein said registering comprises:  
  
registering corresponding anatomic region image segments from said first and second sets of anatomic region image segments.

10. The method according to Claim 9, wherein said registering corresponding

anatomic region image segments comprises:

identifying anatomical landmarks in said first and second sets of anatomic region image segments;

classifying each anatomical landmark as a global landmark or as a fine structure;

and

matching at least one of said global landmarks.

11. The method according to Claim 10, wherein said registering corresponding anatomic region image segments further comprises:

matching at least one of said fine structures.

12. The method according to Claim 10, wherein said identifying anatomical landmarks comprises:

performing edge enhancement;

performing border connection;

eliminating insignificant edges; and

enhancing remaining edges.

13. The method according to Claim 1, further comprising:

applying at least one computer-aided detection (CAD) system to each of said first

and second radiological image sets to produce first and second detection results, respectively;

performing location adjustment on said second detection results, using said image parameters, to produce registered second detection results; and

temporally comparing said first detection results and said registered second detection results.

14. The method according to Claim 1, further comprising:

generating said first and second sets of radiological images.

15. The method according to Claim 11, wherein said common portion comprises a lung region and wherein said generating comprises, for each of said first and second sets of radiological images:

extracting a thoracic body region from a set of three-dimensional computer tomography (CT) images;

extracting a lung region from said thoracic body region;

separately extracting soft tissue regions and bone regions from said lung region;

and

separately interpolating said soft tissue regions and said bone regions to produce interpolated soft tissue regions and bone regions; and

performing frontal and lateral view projections on each of said interpolated soft

tissue regions and bone regions.

16. A computer-readable medium containing software code that, when executed by a computing platform, causes the computing platform to perform the method according to Claim 1.

17. The method according to Claim 16, wherein said registering comprises:  
performing body part registration.

18. The method according to Claim 17, wherein said registering further comprises:  
performing the following steps, prior to said body part registration, if the second set of radiological images only partially covers an area under consideration:  
performing slice matching of said second set of radiological images, relative to said first set of radiological images; and  
determining top and bottom positions of said second set of radiological images.

19. The method according to Claim 16, further comprising:  
applying at least one computer-aided detection (CAD) system to each of said first and second radiological image sets to produce first and second detection results, respectively;

performing location adjustment on said second detection results, using said image parameters, to produce registered second detection results; and

temporally comparing said first detection results and said registered second detection results.

20. A computer system adapted to perform the method according to Claim 1.

21. A system for processing radiological images, comprising:

an image registration component adapted to receive first and second sets of radiological images obtained from a common portion of a common subject, the image registration system adapted to produce a registered second set of radiological images and a set of image parameters describing a shift of said second set of radiological images relative to said first set of radiological images; and

a temporal comparator adapted to receive said first set of radiological images, said registered second set of radiological images, and said image parameters and to perform a comparison between said first set of radiological images and said second set of radiological images.

22. The system according to Claim 21, further comprising:

a slice-matching component adapted to receive said second set of radiological images and to perform slice matching of said second set of radiological images relative to

said first set of radiological images; and

a top and bottom determiner adapted to determine top and bottom positions of said second set of radiological images.

24. The system according to Claim 21, wherein said image registration component comprises:

a segmentation component adapted to segment said first and second sets of radiological images to produce first and second sets of segmented radiological images;

a registration component adapted to register at least one segmented anatomic region of said second set of segmented radiological images with said first set of segmented radiological images to produce a registered second set of segmented radiological images; and

a combiner adapted to combine said registered second set of segmented radiological images to produce said registered radiological image set and said image parameters.

25. The system according to Claim 24, wherein said segmentation component is further adapted to perform anatomic region segmentation on said first and second sets of segmented radiological images to produce first and second sets of anatomic region image segments.



26. The system according to Claim 25, wherein said registration component is further adapted to register corresponding anatomic region image segments from said first and second sets of anatomic region image segments.

27. The system according to Claim 21, further comprising:

at least one computer-aided diagnosis (CAD) system adapted to process said first set of radiological images and said second set of radiological images to produce first and second detection results, respectively;

a location adjustor adapted to receive said second detection results and to receive said image parameters, the location adjustor applying said image parameters to said second detection results to produce registered second detection results; and

a temporal comparator adapted to receive and to compare said first detection results and said registered second detection results.

28. The system according to Claim 27, further comprising:

means for generating said first and second sets of radiological images.